



# Guide to Dual Flight Operations:

## Vaisala RS92-NGP Preparation and Performance



*Data Continuity Study  
Sterling Field Support Center*

Attachment F

# Vaisala RS92-NGP

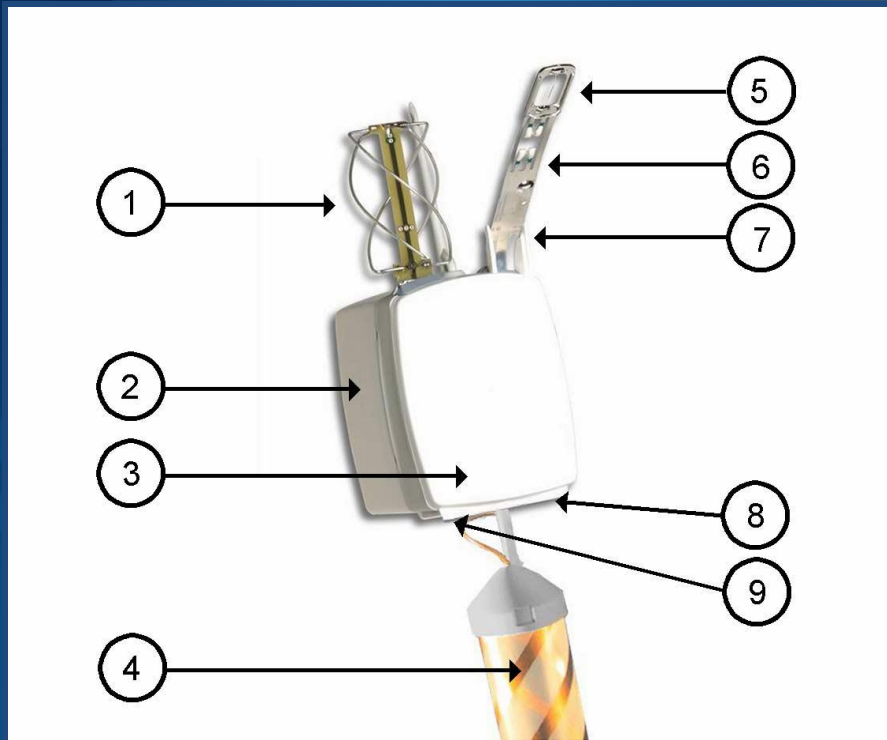
## Preparation and Performance

- This familiarization is designed for observers who have taken the RRS certification test.

### Covered Topics:

- RRS System Initialization
- Radiosonde Preparation and Handling
- Baselining and GPS lock
- Launching the Radiosonde
- Quality controlling after release
- Editing the Coded Messages
- Archiving
- Capture
- Controlling the TRS Antenna
- Multiple Releases
- RRS Helpline Function

# Vaisala RS92-NGP

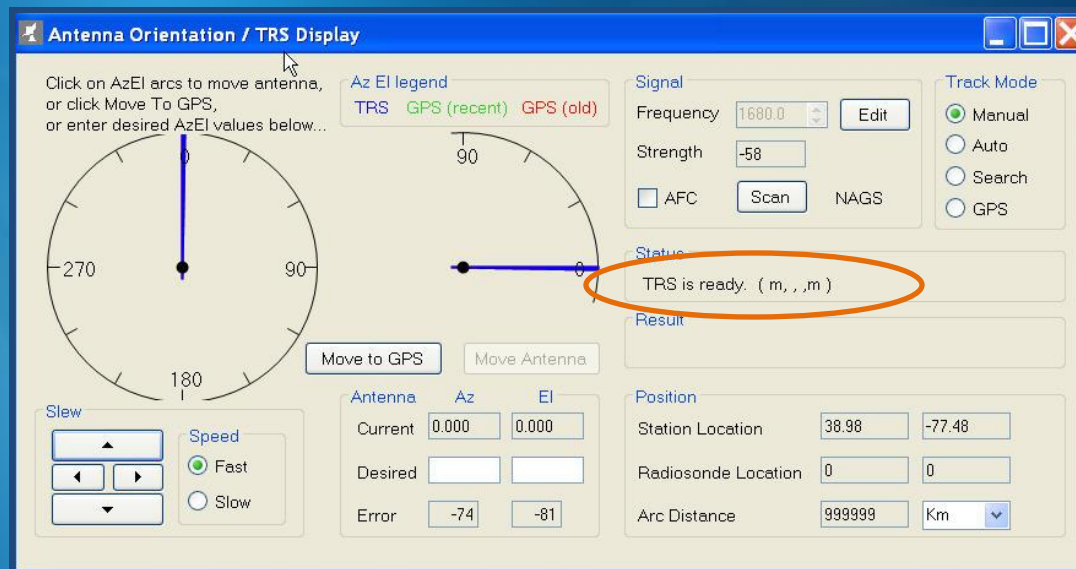


- 1 = GPS Antenna
- 2 = Battery Housing
- 3 = Vaisala Radiosonde RS92-NGP
- 4 = Antenna, mailing bag inside
- 5 = Temperature Sensor
- 6 = Humidity Sensor
- 7 = Sensor Boom
- 8 = FSD25 Interface
- 9 = Additional Sensor Interface

Total Weight of Vaisala RS92-NGP: 305 grams

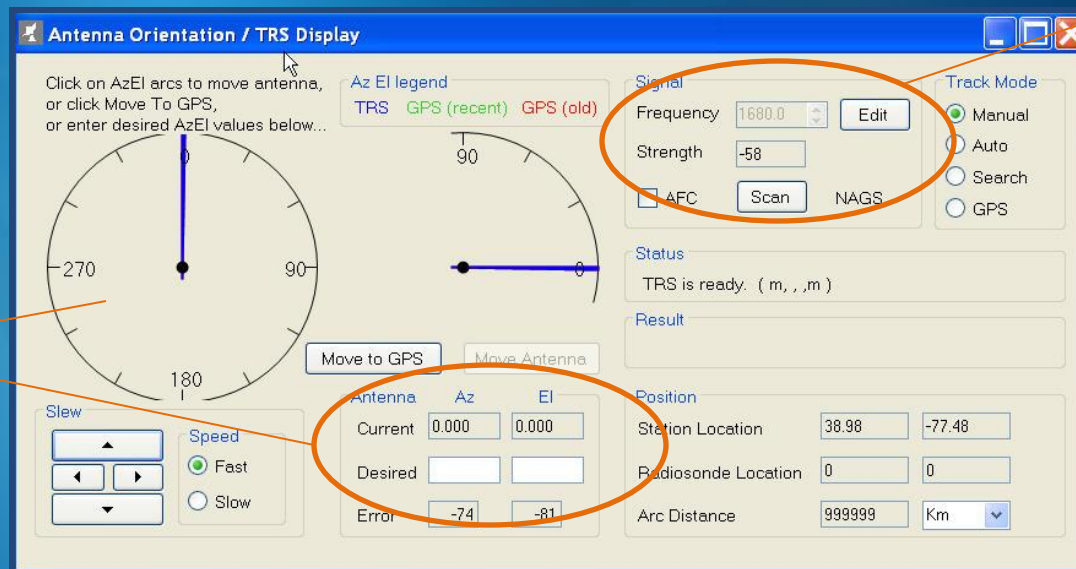
# RRS System Initialization

- Start RWS and allow TRS to warm-up
  - Allow at least 30 minutes prior to baseline
    - TRS Warm-up is dependent on ambient temperatures, but generally lasts between 10-30 minutes
    - Initialization takes approximately 1 minute
    - SPS requires ~15 minutes to establish the GPS almanac
  - The TRS Status Line on the Antenna Orientation Display will indicate “TRS is ready” when warm-up and initialization is complete



# RRS System Initialization

- Prepare the TRS for baseline
  - Orientate the TRS Azimuth and Elevation towards the baseline location
  - Tune the TRS to the desired radiosonde frequency



Orientating TRS  
Azimuth and  
Elevation

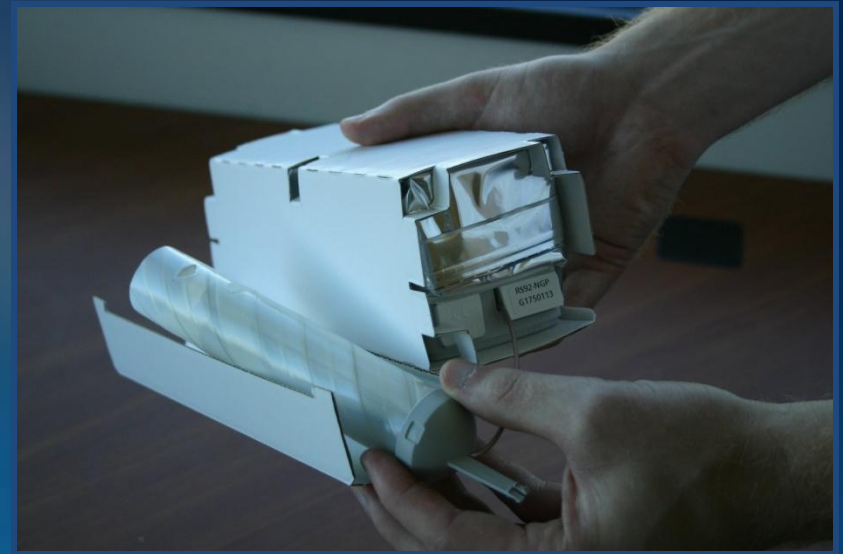
Setting the  
frequency



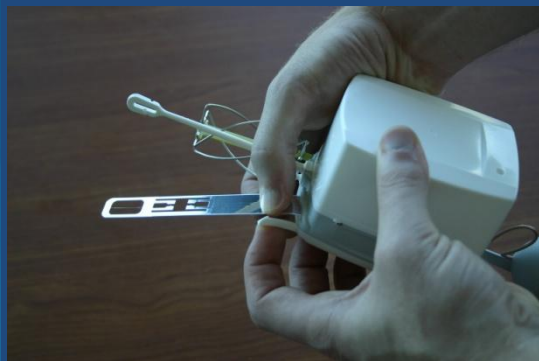
# Radiosonde Preparation and Handling

- Carefully unpack the radiosonde and inspect for damage
- Record Serial Numbers
- Place on the Frequency Setting Device (FSD) to set the frequency and burn off contaminants
  - Plug connector into radiosonde
  - Turn on FSD power
  - Select frequency channel

CH1= 1676 MHz   CH2= 1678 MHz  
CH3= 1680 MHz   CH4=1682 MHz



# Radioonde Preparation and Handling



- Plug in the battery connector and attach the battery pack
  - A click will indicate the radioonde edges are sealed
- Carefully clip the sensor boom into place
- Plug in the transmitter into the bottom of the radioonde between the FSD25 and Additional Sensor Interfaces
- Note the lifting device

# Baselining and GPS Lock

- Prior to Baselining
  - Ensure the TRS is orientated to the baseline position, tuned to the correct frequency, and that the AFC is ON
- Baseline Position
  - Radiosonde should be placed on a radiosonde stand or suspended from above
  - Do not place radiosonde on a solid surface as this may result in poor performance
  - Place under or near the GPS repeater (repeater must be powered on)
  - Observer **MUST** wait at least **5 minutes** before accepting baseline. Time is needed for the sensors to stabilize and for a proper sensor correction to be calculated
    - *Failure to do so will result in a required termination*
- A minimum of 4 satellite matches are required for GPS lock



# Baselining and GPS Lock



Vaisala RS92-NGP on  
Radiosonde Stand



Vaisala RS92-NGP  
suspended from above

# Baselining and GPS Lock

- If there is no GPS during baseline (Ref: RRS User's Guide)
  - Verify Signal Strength and Antenna Position
  - Verify that the correct amount of time has passed
  - Reset the radiosonde
    - Carefully open the plastic casing and disconnect the battery
  - Reset the SPS via the Hardware Manager Status Display
  - Reset the UPS power via the Hardware Manager Status Display
    - This may require the TRS to warm-up and complete initialization processes again

**\*Allow at least 15 minutes for GPS almanac to rebuild after performing an UPS or SPS reset\***
- If the pressure discrepancy is within  $\pm 3$  hPa, accept baseline
  - “Waiting for Release” will then be displayed on the RWS screen

# Baselining and GPS Lock

- For additional information and assistance
  - FAQs Website
    - <http://opsl3web.nws.noaa.gov/rrd/>
  - RRS Helpline
    - (703) 661-1268

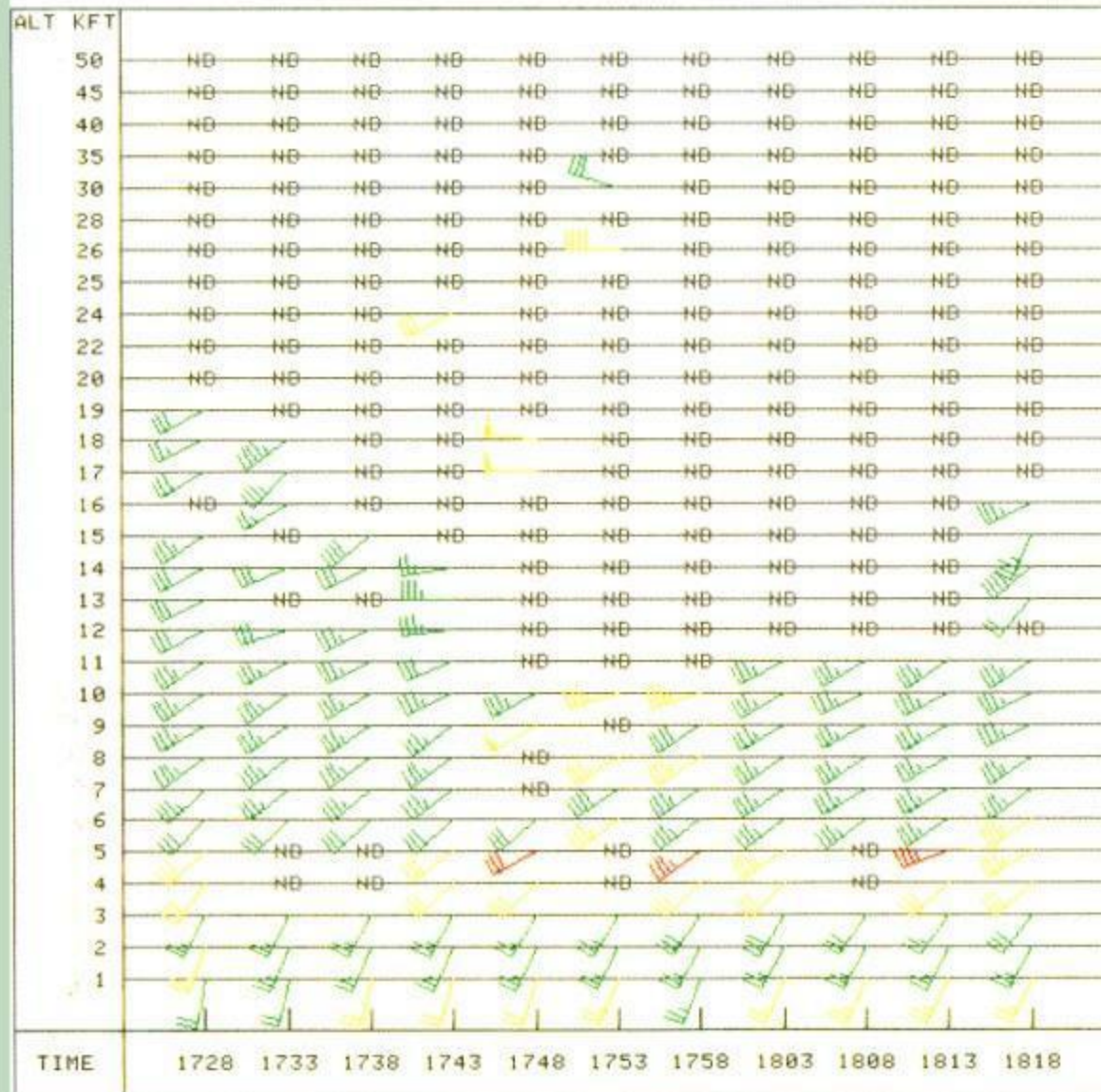
Take a Break..



# Launching the Radiosonde

- Position the TRS before proceeding to the release site
  - Manual Track Mode
  - Direct Azimuth and Elevation to where the radiosonde is expected to travel (downwind)
- After release, utilize the remote Control Display Unit (CDU) to track the radiosonde
  - Wide Angle Gathering System (100 °)
  - Narrow Angle Gathering System (15 °)





05/14/97 13:32

VAD WIND PROFILE  
48 UWP

05/12/97 18:18

RDA:KAMX 25/36/39N  
111 FT 80/24/46W

MODE A / 11

MAX=229 DEG 39 KT  
ALT 14000 FT



FL= 1 COM=1

Q15 R 1202 R  
43 RPS PRODUCTS  
OVERDUE  
14/1320 #TIME OUT#  
CAN'T EDIT RCM  
HARDCOPY

# 0x0800 Errors

KWS

Flight Editor Tables Files Messages Tools Window Help

Station ID: KHQF Station Name: QSSTest4 Station Index: 69006 Release Elevation (m): 10.972

### Baseline Display

	hPa	Temp	PH	Lat	Lon
Station	1015.30	9.20	60.0	34.7762	-76.8768
Radioonde					
Discrepancy					

	hPa	Temp	PH	Lat	Lon
1	1014.81	28.99	19.4	0.0001	0.0001
2	1014.75	29.00	19.3	0.0001	0.0001
3	1014.64	29.00	19.3	0.0001	0.0001
4	1014.87	28.99	19.3	0.0001	0.0001
5	1014.81	28.99	19.3	0.0001	0.0001
6	1014.74	28.97	19.3	0.0001	0.0001
7	1014.74	28.98	19.3	0.0001	0.0001
8	1014.74	28.98	19.3	0.0001	0.0001
9	1014.74	28.98	19.2	0.0001	0.0001
10	1015.11	28.98	19.3	0.0001	0.0001
11	1014.96	28.97	19.2	0.0001	0.0001
12	1014.96	28.96	19.2	0.0001	0.0001
13	1014.57	28.97	19.2	0.0001	0.0001
14	1014.80	28.98	19.2	0.0001	0.0001
15	1014.50	28.98	19.2	0.0001	0.0001

Back Reject

Calculate Accept

Status:

	hPa	Temp	PH	Lat	Lon
Std. Dev.	0.152347	0.010873	0.059628	0.000000	0.000003
High	1015.11	29.00	19.4	0.0001	0.0001
Low	1014.50	28.96	19.2	0.0001	0.0001

### Antenna Orientation / TRS Display

Current Azimuth: 56.91 Current Elevation: 0.38

WAGS

### GPS Status Window

SPS 9 Match  
GPS 10 Radiosonde  
11 Base

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
SPS																
GPS																

Signal Frequency: 1675.9 Set  
Strength: 65.15  
☒ AFC Scan  
Status: TRS is ready  
Position: Station Location: 34.7758 -76.8776

### Status Messages Display

Add Message

UTC Time	Message	Comment
21:24:34.93	Flight was initiated	
21:24:44.71	Status Code: 0 - UPS	
21:24:54.34	TRS initialization in progress	
21:25:04.75	Status Code: 16 - UPS is now running on battery	
21:25:10.03	Status Code: 8 - UPS is now running on on-line power supply	
21:25:49.13	TRS completed initialization successfully	
21:25:49.13	TRS is ready	
21:26:24.53	TRS Error Reported: Failure: Not receiving data	
21:32:54.32	TRS Error Reported: LRU: 0000000000, SCA: 0000, MCU: 000000, Receiver: 0x01, Scanner: 00, Power Supply: Voltage OK	
21:34:40.03	SPS has been initialized successfully	
21:47:34.26	TRS Error Reported: LRU: 0000000000, SCA: 0000, MCU: 0x0800, Receiver: 0000, Scanner: 00, Power Supply: Voltage OK	
21:48:49.31	TRS Error Reported: LRU: 0000000000, SCA: 0000, MCU: 0x0800, Receiver: 0000, Scanner: 00, Power Supply: Voltage OK	
21:51:07.84	User added message	30 db
21:53:23.87	User added message	35 db
21:54:47.87	User added message	40 db
22:00:26.25	User added message	35 db Secondary position
22:03:10.65	Observer has backed out of baseline and reentered preflight information entry	
22:03:14.35	TRS Error Reported: LRU: 0000000000, SCA: 0000, MCU: 0x0800, Receiver: 0000, Scanner: 00, Power Supply: Voltage OK	
22:03:34.39	TRS Error Reported: LRU: 0000000000, SCA: 0000, MCU: 0x0800, Receiver: 0000, Scanner: 00, Power Supply: Voltage OK	
22:03:49.26	TRS Error Reported: LRU: 0000000000, SCA: 0000, MCU: 0x0800, Receiver: 0000, Scanner: 00, Power Supply: Voltage OK	
22:03:52.46	SPS has been initialized successfully	

0800 Errors.bmp  
Type: BMP File  
Size: 3.75 MB  
Dimension: 1280 x 1024 pixels

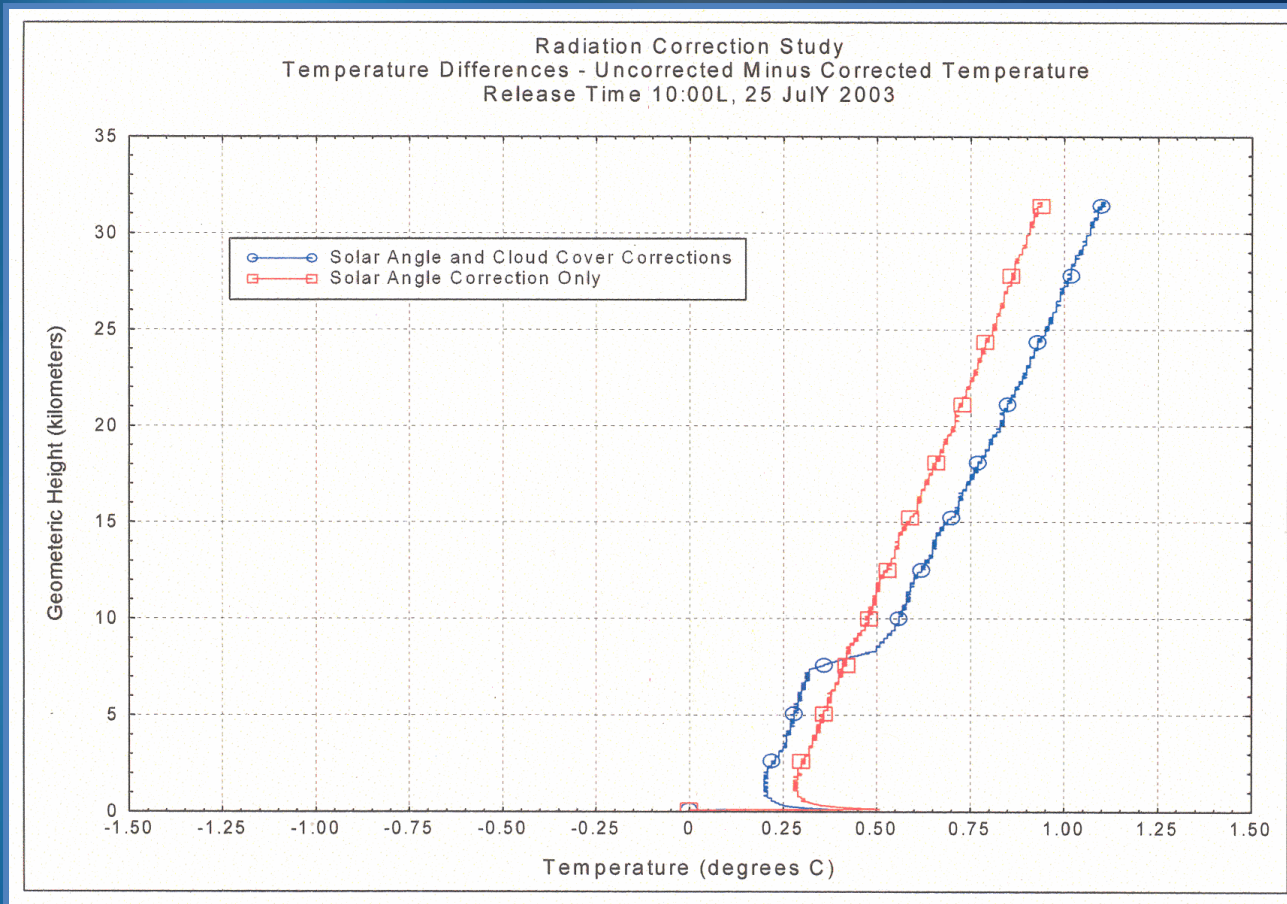
# Quality Control After Release

- Ensure the TRS is tracking appropriately and that signal strength is acceptable
  - Place the Antenna into the Move to GPS mode only if GPS is available
    - Selecting Move to GPS when GPS is not available may cause the software to freeze
  - Monitor the Status Messages for any tracking notifications
- Update the Surface Observation and release time as necessary
  - For release time, check the first pressure data point below the red line in the Received PTU Tabular Display
    - Should have a pressure less than or equal to the release pressure shown in the Surface Observation
  - Check the Geopotential Height and ensure it increases with time
  - Verify the Cloud/Weather observation and ensure it's accurate at release

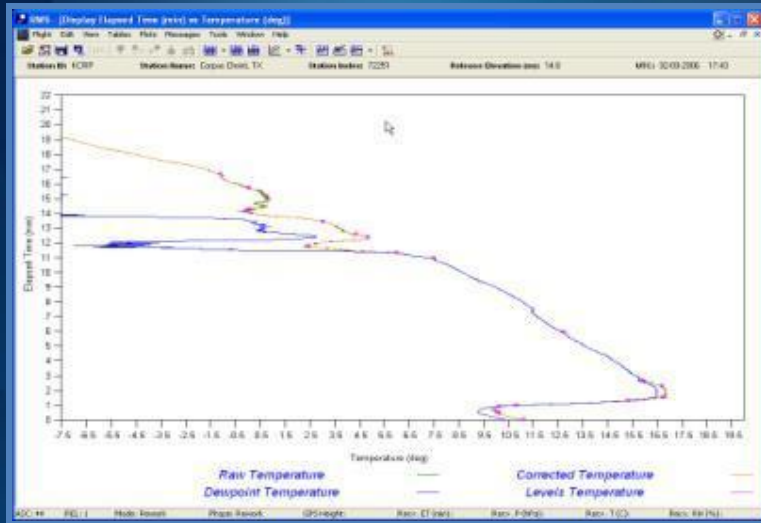


# Temperature Correction

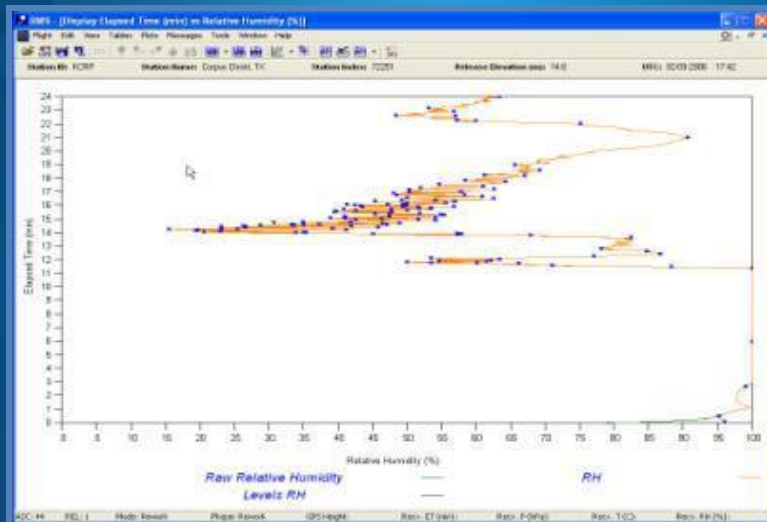
- Temperature correction added to raw temperature
  - Red is the correction for the solar angle with no clouds
  - Blue is the correction for the solar angle with a cloud deck at 8 km



# Quality Control After Release



Wet-bulb Effect



Noisy RH Data

- Marking & Editing Data
  - Verify data continuity from the surface into flight
    - Dry RH bias just off the surface
  - Common data quality problems requiring attention
    - “Wet-bulb effect”
    - Noisy RH data
    - Super-adiabatic lapse rates
  - During flight, periodically check for anomalous data
    - Plots
    - Check Messages

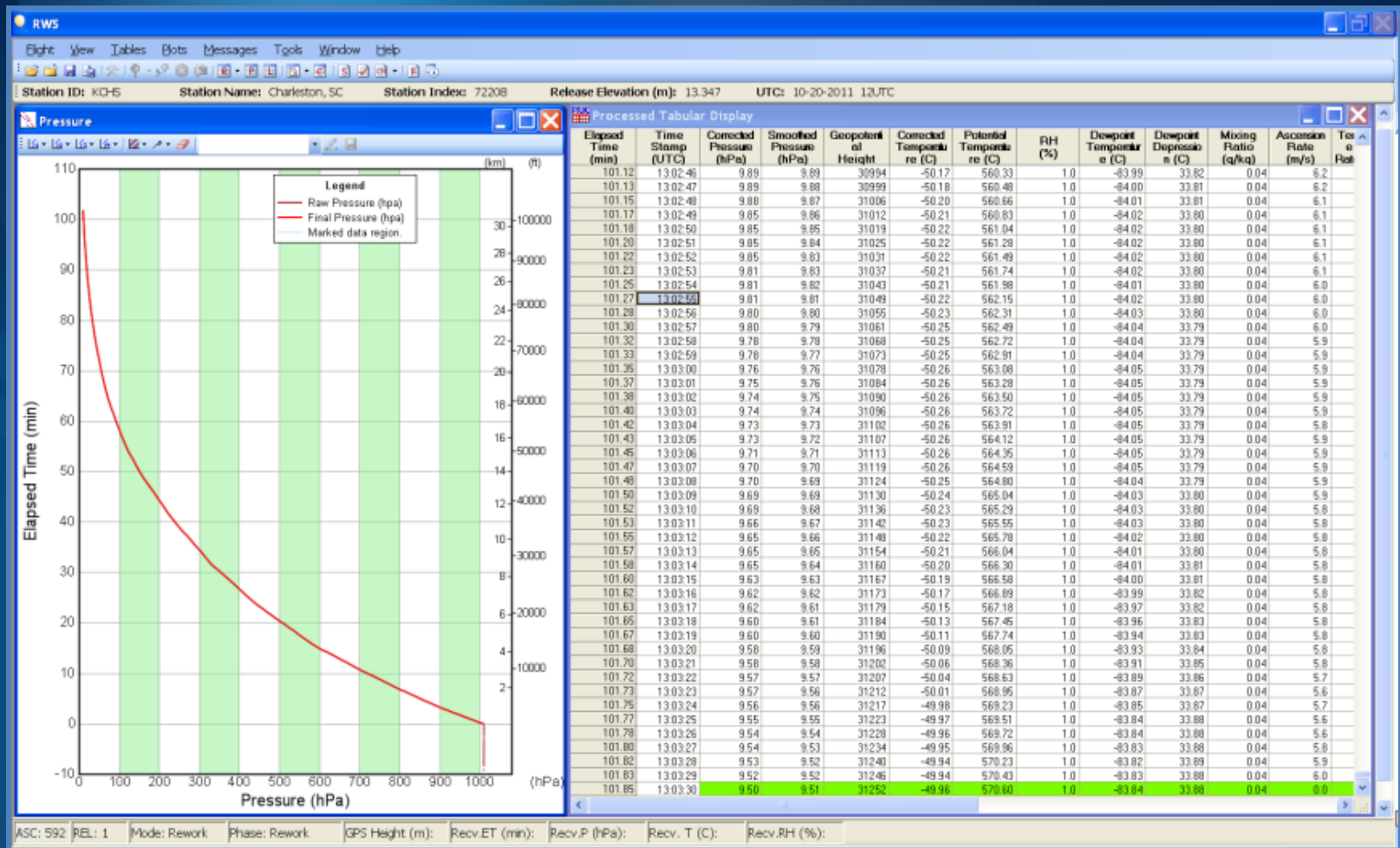


# Editing Coded Messages

- Once the Coded Messages are generated, review plots, Check Messages and Tabular data prior to transmission
  - If changes to the flight data are made, Coded Messages will need to be recoded
    - Edits made in the Processed Tabular Display
- Do not edit the body of the Coded Messages unless absolutely necessary
  - Necessary edits include:
    - Adding appropriate 101 groups
    - Adding appropriate Icing comments to RADAT
  - Editing the message body will not affect the processed data
  - Edits to the message body are not saved to the NCDC Archive file

# Quality Control After Release

- When the flight has terminated, verify termination time and reason



# Take a Break..



# Transmitting an Archived Flight

- In Utilities, select NCDC Archive Utilities
  - Select the flight to Archive
  - Select “Build Archives and send to NCDC”
  - Individual log files for each office can be found here:
    - [www1.ncdc.noaa.gov/pub/data/ua/RRS/2008/](http://www1.ncdc.noaa.gov/pub/data/ua/RRS/2008/)

## 2. NCDC Archive Utility

## 1. Tools -> Utilities

RWS - [RWS Software Utilities]

Flight View Tables Plots Messages **Tools** Window Help

Station ID: KSTP Station Name: SterlingTest2 Station Index: 69101 Release Elevation (m): 88.103 UTC: 03-19-2012 12:51

RWS Software Utilities

- Flight Management Utilities
  - NCDC Archive Utility**
  - Flight Export Utility
  - Flight Import Utility
  - Flight Deletion Utility
  - Flight Summary Report
- Application Utilities
  - System Color Setup Utility
- Administrative Utilities
  - Database Backup and Restore Utilities
    - Backup Utility
    - Restore Utility

Ascension Number	Release Number	Observation Date	Observation Time	Active Flight	Flight Outcome	Archived?	WMO Number
715	1	12-18-2011	12UTC	No	Unsuccessful	No	74389
2	1	01-01-2012	12UTC	Yes	Unsuccessful	Yes	74389
3	1	01-02-2012	00UTC	Yes	Successful	Yes	74389
711	2	12-14-2011	12UTC	Yes	Successful	Yes	72776
588	1	10-18-2011	00UTC	Yes	Successful	Yes	72768
551	1	10-02-2011	00UTC	No	Unsuccessful	No	72597
474	1	08-24-2011	12UTC	No	Unsuccessful	No	72582
44	1	01-24-2012	00UTC	No	Unsuccessful	No	72493
45	1	01-24-2012	12UTC	Yes	Successful	Yes	72493
46	1	01-25-2012	00UTC	No	Unsuccessful	No	72493
47	1	01-25-2012	12UTC	Yes	Successful	Yes	72493
48	1	01-26-2012	00UTC	Yes	Successful	Yes	72493
49	1	01-26-2012	12UTC	Yes	Successful	Yes	72493
57	2	01-30-2012	12UTC	No	Unsuccessful	No	72493
57	3	01-30-2012	12UTC	Yes	Unsuccessful	No	72493
62	1	02-03-2012	12UTC	Yes	Successful	Yes	72493
482	1	08-11-2011	12UTC	Yes	Successful	Yes	72403
483	1	08-12-2011	00UTC	Yes	Successful	Yes	72403
484	1	08-12-2011	12UTC	Yes	Successful	Yes	72403
470	1	08-15-2011	12UTC	Yes	Successful	Yes	72403

Build archives and send to NCDC

## 3. Build Archives and send to NCDC



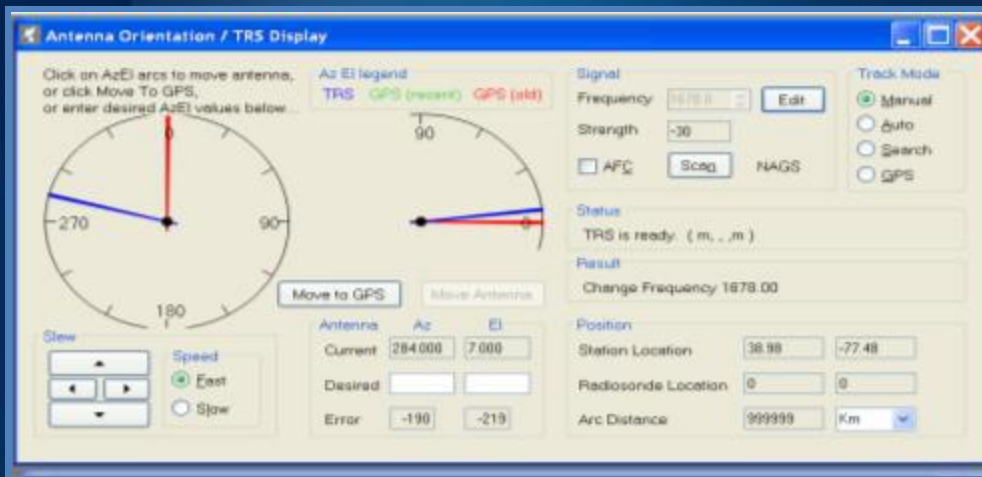
# RWS Capture Program

- Captures the flight data and associated logs
  - Sends flight data and logs to WSH
    - Software and RRS performance analysis
  - First 30 days
    - Run Capture after each flight
  - After the first 30 days
    - Run Capture for flights that have problems or pose concerns
- Select icon located on the desktop
  - Select the most recent release & ascension number from a pull down menu
  - Click Capture
  - Flight data and logs are then sent to WSH

# Controlling the TRS Antenna

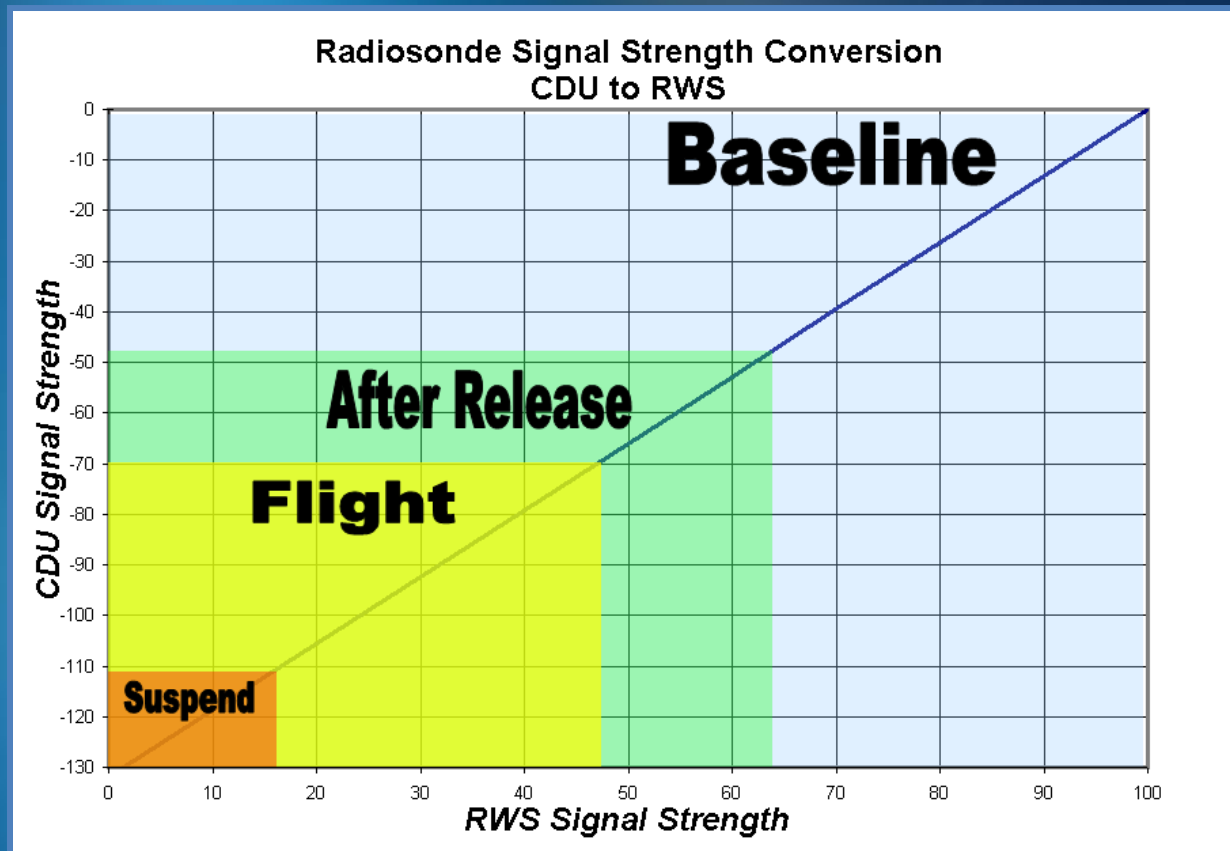


Remote Control Display Unit (RCDU)



```

Az:284.57°   Err:026>
El:007.29°   Err:018^
F :1678.34   SIG:-102
Ant:Man      RX :Man
  
```



# Second and Third Releases

- Leave UPS(TRS) ON after the first release
- Place the TRS in Manual
- Set the new radiosonde to a different frequency
- Set the TRS to the new frequency
  - Don't Scan as this could cause the TRS to lock onto the previous radiosonde
- Move TRS back to the baseline position
- After a successful flight, select the active release to Archive



# NWS Sterling Field Support Center RRS Helpline

- ❖ The RRS Helpline does not supersede your local or regional policies, procedures or regulations.
- ❖ Problems identified to be outside of the scope of the RRS Helpline will be escalated to the appropriate personnel.
- ❖ Issues affecting successful launches take priority.

## Hours of Operation

M-F

10:00-02:00 UTC

No Holidays



## Contact

(703) 661-1268

(703) 661-1293